

# Status of Bengal Florican *Houbaropsis bengalensis* in Nepal

NABIN BARAL, NILESH TIMILSINA and BIJAY TAMANG

Surveys for the Endangered Bengal Florican *Houbaropsis bengalensis* were carried out in three protected areas in the Nepal terai in 2000–2001 to determine the species’s status and distribution. Most sightings were of males in flight, and in aerial and ground displays, whereas only three females were recorded during the survey. Altogether, 21–30 birds were recorded from the three protected areas, and a total population of 32–60 individuals was estimated. Since 1982, the population appears to have been stable at Royal Suklaphanta Wildlife Reserve and Royal Bardia National Park, but it has declined at Royal Chitwan National Park. A reduction in grassland area, changes in habitat structure, and inappropriate grassland management practices are considered responsible.

## INTRODUCTION

The Bengal Florican *Houbaropsis bengalensis* is one of three bustards found in the Indian subcontinent. It is listed as Endangered on the IUCN Red List, being one of 29 threatened bird species in Nepal (BirdLife International 2001). It is included on Appendix I of CITES, and it is one of nine birds protected under the National Parks and Wildlife Conservation Act (1973) in Nepal (Rahmani *et al.* 1991, Baral *et al.* 2001). It was once common in the grasslands in north India and Nepal, and the Brahmaputra valley of Assam (Rahmani 2001). Being a habitat specialist of alluvial grasslands, dominated by *Imperata cylindrica*, *Saccharum munja* and *Desmostachya bipinnata*, the Bengal Florican is a classic example of a species with a narrow ecological niche, and which has become increasingly rare with a very small, rapidly declining population, largely as a result of widespread loss of its habitat (Rahmani 2001, BirdLife International 2001).

In Nepal, a study initiated by BirdLife International in 1982 located 30–50 floricans distributed in five sites:

Royal Chitwan National Park (RCNP), Royal Bardia National Park (RBNP), Royal Suklaphanta Wildlife Reserve (RSWR), Koshi Tappu Wildlife Reserve (KTWR) and an unprotected area near Koshi Barrage (KB) in east Nepal (Inskipp and Inskipp 1983). The KB site appears to have lost its small population since 1980, following a change in the course of the river during the monsoon. In KTWR the species was once fairly common (Dahmer 1976) but it appears to have disappeared from this site, as there has been only one confirmed record in 1986, one in 1989 and no records since 1990 (Dodman and Guinan 1989, Weaver 1991, Baral *et al.* 2001). At present, the species is almost exclusively restricted to three areas: RCNP, RBNP and RSWR. Of these, RSWR holds the largest population, and the species is patchily distributed but locally common (Inskipp and Inskipp 1983, Baral 2001, Baral *et al.* 2001).

As the field situation can change rapidly, continual monitoring is essential to ensure conservation of this species. Prior to this study, considerable time had elapsed since the last surveys in Nepal, and there was

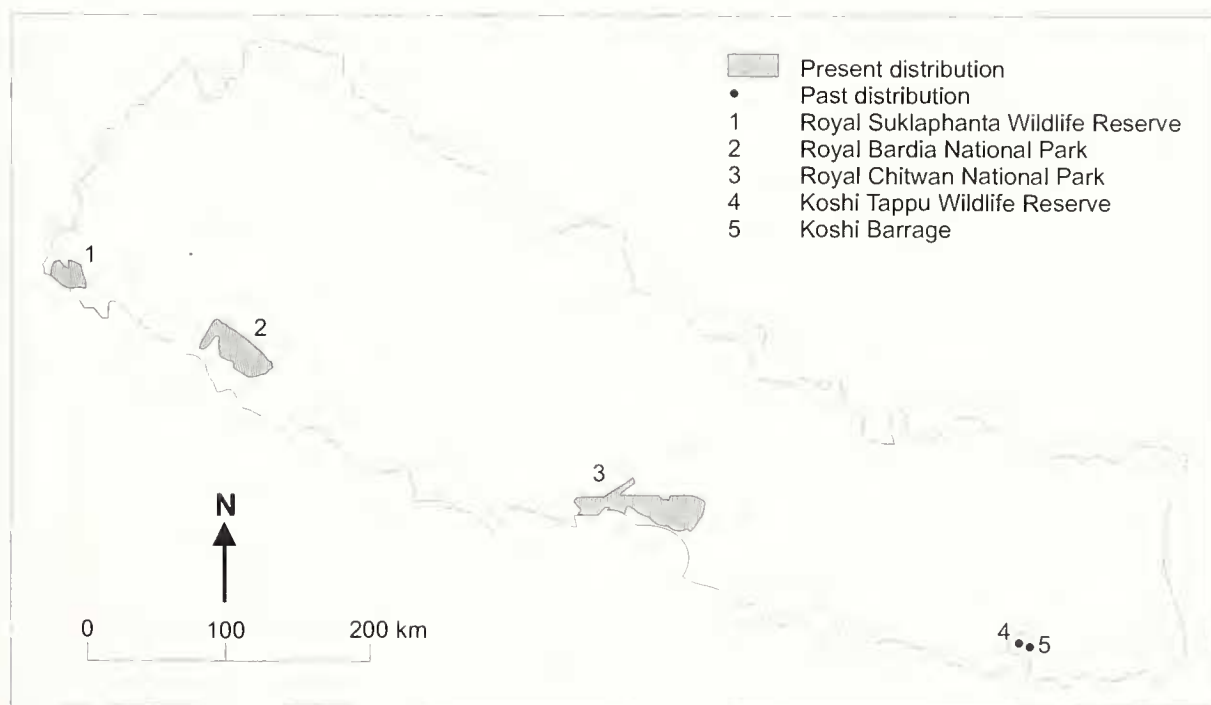


Figure 1. Map of Nepal showing the distribution of Bengal Florican.

no up-to-date reliable information available on trends. This study attempted to fill this gap, and it provides an insight into the present status of Bengal Florican in Nepal.

### Study areas

Royal Chitwan National Park (RCNP, 27°30'N 84°43'E, 932 km<sup>2</sup>) lies in the central part of Nepal, Royal Bardia National Park (RBNP, 28°38'N 81°20'E, 968 km<sup>2</sup>) lies in the western part, and Royal Suklaphanta Wildlife Reserve (RSWR, 28°35'N 80°25'E, 305 km<sup>2</sup>) lies in the far south-western part of the country (Fig. 1). These areas have a subtropical climate, with more than 90% of the annual precipitation falling in the monsoon season between mid-June and September. There are two other distinct seasons: hot-dry from February to mid-June and cool-dry from late September to mid-February. The vegetation in the Nepalese terai is mainly dominated by 'sal' *Shorea robusta* forest, plus 'khaire-sissoo' *Acacia-Dalbergia* forest, grassland and wetlands. Internationally important large tracts of grassland occur inside these protected areas, among which Suklaphanta (54 km<sup>2</sup>) is the largest. They are important for a number of threatened mammals (e.g. one-horned rhinoceros *Rhinoceros unicornis*, swamp deer *Cervus duvauceli*, Asian elephant *Elephas maximus* and tiger *Panthera tigris*) and birds (e.g. Slender-billed Vulture *Gyps tenuirostris*, Swamp Francolin *Francolinus gularis*, Bristled Grassbird *Chaetornis striatus*, and Hodgson's Bushchat *Saxicola insignis*).

### METHODS

Areas of suitable habitat were visited during the breeding season when displaying territorial males are most visible. Floricans are very territorial during the breeding season (Ali and Rahmani 1982–1984, Sankaran and Rahmani 1986, Manakadan and Rahmani 1986), so different display sites were assumed to belong to different males. As females are more difficult to locate, population estimates were based on the assumption of an equal sex ratio. Observations were carried out in the early morning (06h30 to 10h00) and late afternoon (16h30 to 19h00) when the species is most active (Ali and Ripley 1969). Observations were made using binoculars from machans (towers) for a better view of the grasslands, generally with minimal disturbance to floricans. Some areas were also surveyed on elephant back and from vehicles. For each sighting of floricans, the number and sex of individuals, their activity, time, and weather was

recorded, and the time spent in each area was noted, together with a general impression of the habitat. Group discussions were held with park officials, game scouts and local people to glean information on the presence of Bengal Florican and its conservation.

### RESULTS

#### Royal Suklaphanta Wildlife Reserve

Grasslands surveyed: Suklaphanta, Singhpur, Karaiya and Haraiya; 5–14 May 2000

Twelve floricans (10 adult males and two subadult males) were recorded, including six at one site. Only two males were confirmed to be holding territories, as evidenced by aerial and ground displays. Most of the records were of birds in flight or display, with up to four males seen in flight at the same time. The presence of sub-adults suggested that some breeding had been successful. The survey results suggested that the population had remained stable since 1982. No floricans were recorded during a brief visit to Karaiya. However, on one occasion, two males flew south-east from Suklaphanta towards Karaiya, and park officials and game scouts reported two males displaying at this site. At present, Haraiya and Singhpur do not hold any floricans, but if managed suitably, they could provide additional habitat for floricans. Uncontrolled fire, the invasion of saplings and tall grasses (especially *Grewia* spp.), and natural predators were recorded as major threats to floricans at this site.

#### Royal Bardia National Park

Grasslands surveyed: Khauraha, Bagaura and Lamkauli; 28 April to 4 May 2000

We recorded five floricans, including two males and two females at Lamkauli and one male at Bagaura. All the males were seen in areas of short grass (15–35 cm), whereas the females were in tall grass (>110 cm) by the side of the road. Because the grass was mostly short, and the visibility was good, it is assumed that all floricans were recorded. Most of the small grass patches and potential floricant habitats outside and inside the park were also covered, but no floricans were seen. Discussions with park staff suggested the presence of floricans at Khauraha, but we did not record any. Short grasslands have been encroached by trees, bushes and tall grass species at Khauraha, and this might have made the habitat unsuitable for floricans. The habitat at Bagaura and Lamkauli seemed to be ideal for the floricans, being dominated by *Imperata cylindrica* and

**Table 1.** Survey results and population estimates for Bengal Florican in Nepal. (Key: <sup>a</sup>Resources Nepal 1998; <sup>b</sup>Inskipp and Inskipp 1983 and C. Inskipp *in litt.* 2002; <sup>c</sup>Weaver 1991; <sup>d</sup>present study; dash indicates no survey was conducted; <sup>e</sup>minimum population estimate based on number of confirmed adult males multiplied by two; maximum estimate incorporates unconfirmed records)

Protected area	Grassland area (km <sup>2</sup> ) <sup>a</sup>	No. floricans recorded				Population estimate <sup>e</sup>
		1982 <sup>b</sup>	1990 <sup>c</sup>	2000 <sup>d</sup>	2001 <sup>d</sup>	
RCNP	48.1	8–21	-	-	4–11	6–22
RBNP	2.9	9–10	6	5	5	6–10
RSWR	55.4	15	17	12–14	12–14	20–28

*Saccharum* spp. Khauraha requires intensive management to improve suitability for floricans. However, the potential maximum population of floricans at RBNP is limited by the restricted area of habitat available.

### Royal Chitwan National Park

Grasslands surveyed: Jay Mangala, Kachuwani, Dumaria, Jarneli, Ghatgain, Sukhebbhar, Bhimle, Khorla Mohan and Khagendra Malli; 31 March to 8 April 2001

Three adult males and one female were recorded. Two males held territories, one in Sukhebbhar and one in Khagendra Malli, as evidenced by aerial and ground displays. One male at Jarneli was seen in flight, and a female was recorded at Dumaria. There were additional reported sightings in Khagendra Malli and Bhimle. Of five areas where floricans were recorded by Inskipp and Inskipp (1983), only Sukhebbhar and Dumaria still appeared to support populations, but Inskipp and Inskipp (1983) did not record floricans at Jarneli. Grasslands at this site have been lost through succession into other habitats, and this process is likely to continue without suitable management interventions.

### Total population

While it is difficult to accurately estimate the current population of Bengal Florican in Nepal, it has certainly declined over the past two decades (Table 1). We recorded 21–30 birds in the three sites we surveyed. Assuming an equal sex ratio, the population may be 32–60 birds. The small number of subadults recorded could imply poor breeding success or poor juvenile survival, but may simply reflect the difficulty of detecting individuals other than displaying males.

## DISCUSSION

### Population and movements

The status of the Bengal Florican and its habitat in Nepal has deteriorated since 1982, and the total population has declined. The population in Nepal was estimated to be 56–82 birds in 1982 (Inskipp and Inskipp 1983, Inskipp and Collar 1984), and Narayan (1995) estimated a total of probably 100 at four sites. In 2001, we estimated 32–60 individuals in three protected areas. The populations in Bardia and Suklaphanta do not appear to have changed significantly, while the population at Chitwan appears to be decreasing. This can be attributed to shrinkage of habitat and inappropriate grassland management regimes.

Only three out of 21 sightings during the survey were females. Ali *et al.* (1986) recorded three females out of 27 birds observed during the 1985 survey, while Inskipp and Inskipp (1983) counted 5–6 females amongst a total of 35–50 birds. These disparities are probably a result of differences in the behaviour and plumage of the sexes, and in reality females probably equal or outnumber males (Narayan 1992).

Ripley (1982) listed the species as resident in the Indian subcontinent. It is most likely resident in Nepal, but the possibility of local or even long-distance movements should not be ruled out (Inskipp and Inskipp 1983). The former are suggested by our

observations of floricans flying south of Suklaphanta towards the Indian border, and we suspect that some birds may occupy territories in the grasslands of Lagga Bagga, where Rahmani (2001) found one florican. This protected area is contiguous with RSWR in Nepal, and would be better protected through a cooperative agreement between the two countries (Rahmani 1989).

Longer-distance movements are suggested by the absence of floricans from breeding areas in RBNP between November and February (Peet *et al.* 1999). Movements certainly occur in the Brahmaputra valley where much breeding habitat is seasonally flooded, but it is not known where floricans from these areas move to (Narayan 1992, Choudhury 2000). Evidence also suggests that the species is at least partially migratory in South-East Asia. Movements appear to be linked to the south-west monsoon and the consequent seasonal inundation of grassland areas; during wet periods, the species may move northwards to higher and drier areas (Eames 1995). In the Tonle Sap floodplain, Cambodia, floricans breed in grasslands and deep-water rice mosaics during the dry season, and move up to (probably) 50 km during the wet season floods (P. Davidson *in litt.* 2002).

### Grassland management

Floricans were found in grasslands ranging in height from 10 to 110 cm. All the females recorded were located in tall grass, especially *Saccharum spontaneum*, while males favoured short *Imperata* spp. patches. Previous workers have also found that shorter grassland appears to be favoured by males whilst foraging or displaying (Inskipp and Inskipp 1983, Sankaran 1996, Peet *et al.* 1999). However, birds appear to seek shelter in taller grass during the heat of the day, and females (and males outside the breeding season) probably spend much of their time in taller grass (Ali *et al.* 1986). It has thus been suggested that the best locations contain areas of shorter grassland dominated by *Imperata cylindrica*, interspersed with patches of taller grassland (Peet 1997, Baral *et al.* 2001, P. Davidson *in litt.* 2002).

In RCNP and RBNP, local people are allowed to collect thatching material from the grasslands from late December to early January. After this, the grasslands undergo annual controlled burning. This encourages the growth of *Imperata* spp. at the expense of taller grass species, and hence encourages shorter swards for the floricans. In RSWR, the main florican grasslands are not near human settlements, so there is little harvesting of grasses, and there is no annual controlled burning by the park authorities. Consequently, these areas are prone to accidental fires. Burning, clearing or grazing of grassland creates suitable habitat for floricans, and if this does not occur, the grassland grows too tall and dense and is apparently vacated by territorial males (Narayan and Rosalind 1990). The population in Dudwa National Park (India) appeared to increase after controlled burning of the grassland (Javed and Rahmani 1998).

In RBNP, the park authority has recently initiated a programme of uprooting woody vegetation from grasslands. This will help to create more suitable habitat for floricans and other grassland-dependent species. Grassland management was initiated in RSWR and RCNP in 1996. However, many grassland areas were

ploughed to prevent encroachment of *Imperata* spp. grassland, which resulted in the temporary loss of floricans (Baral 2001). Management practices commonly fail to consider the ecological requirements of the species, an oversight that can lead to local extinctions. Grassland management for floricans should aim to maintain areas of intact grassland that are not cut or burnt, on a rotational basis, whilst allowing other areas to be harvested by local people, and hence creating a mosaic of tall and short grass patches (Peet 1997, Peet *et al.* 1999, Baral 2001). Further alternatives to grass harvesting should be promoted in communities currently dependent on grassland resources (Peet 1997). Jnawali and Wegge (1999) have proposed clear-felling small blocks of *Shorea robusta* and *Terminalia tomentosa* forest to develop new areas of grasslands.

### Conservation and recommendations

Grasslands are generally poorly represented in the region's protected area system (Rahmani 1988, 1992, Eames 1997, Baral 1998, Buckton *et al.* 1999), and even those within protected areas continue to suffer degradation (Bell and Oliver 1992, Peet 1997). Most grassland patches are now small and isolated, making populations of Bengal Floricans more susceptible to local extinction. Moreover, many areas within the species's range are prone to political instability, so that long-term protection of several sites cannot be guaranteed (Narayan 1995). A landscape ecology approach, integrating social, biological and physical environmental elements at scales compatible with management objectives, will be needed to effectively conserve Bengal Floricans and their grassland habitats. The Bengal Florican should be promoted as a flagship species. Annual monitoring of the population, and detailed ecological studies (making use of radio-telemetry) outside the breeding season are strongly recommended. A pilot study to manage part of the large area of grassland at RCNP specifically for floricans is recommended.

### ACKNOWLEDGEMENTS

We are very grateful to the Oriental Bird Club for funding fieldwork in RSWR and RCNP. Surveys in RBNP was funded by WWF Nepal Program. We are indebted to A. R. Rahmani and Carol Inskipp for their valuable guidance, reference materials, and for reviewing the manuscript. We would like to thank DNPWC and staffs of RCNP, RBNP and RSWR for granting permission and providing help for these surveys. We are very much grateful to S. R. Jnawali, Sarita Jnawali, Hem Sagar Baral and Haris C. Rai for their guidance and valuable suggestions. Our special appreciation goes to Mohan Chaudhary, Mahadev Bista, Trilok Chitrakar, Radha K. Shrestha, and Thaneswor Tiwari and his family for their kind and generous support during the fieldwork. Thanks are also due to those local birdwatchers and naturalists who shared their knowledge. Joel T. Heinen provided invaluable feedback while preparing the manuscript and an anonymous referee improved the manuscript with critical comments and suggestions.

### REFERENCES

- Ali S., Daniel, J. C. and Rahmani, A. R. (1986) *Study of ecology of certain endangered species of wildlife and their habitats. The floricans. Annual Report 1, 1984–1985*. Bombay: Bombay Natural History Society.
- Ali, S. and Rahmani, A. R. (1982–1984) *Study of ecology of certain endangered species of wildlife and their habitats: The Great Indian Bustard. Annual report 2*. Bombay: Bombay Natural History Society.
- Ali, S. and Ripley, S. D. (1969) *Handbook of the birds of India and Pakistan*. Vol. 2. Bombay: Oxford University Press.
- Baral, H. S. (1998) Status, distribution, and habitat preferences of Swamp Francolin *Francolinus gularis* in Nepal. *Ibisbill* 1: 35–70.
- Baral, H. S. (2001) Community structure and habitat association of lowland grassland birds in Nepal. PhD dissertation, Universiteit van Amsterdam and Cardiff University.
- Baral, N., Tamang, B. and Timilsina, N. (2000) The floricans in Royal Bardia National Park. *Danphe* 9(3): 4.
- Baral, N., Timilsina, N. and Tamang, B. (2001) Bengal Florican in Royal Suklaphanta Wildlife Reserve, Nepal. *Oriental Bird Club Bull.* 34: 30–33.
- Bell, D. J. and Oliver, W. L. R. (1992) Northern Indian tall grassland: management and species conservation with special reference to fire. Pp. 109–123 in K. P. Singh and J. S. Singh, eds. *Tropical ecosystem: ecology and management*. New Delhi: Wiley Eastern.
- BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book*. Cambridge, U.K: BirdLife International.
- Buckton, S. T., Nguyen Cu, Ha Quy Quynh and Nguyen Duc Tu (1999) *The conservation of key wetland sites in the Mekong Delta*. Hanoi: BirdLife International Vietnam Programme.
- Choudhury, A. (2000) *The birds of Assam*. Gauhati: Gibbon Books and World Wide Fund for Nature, India.
- Dahmer, T. A. (1976) Birds of Koshi Tappu Reserve. Unpublished report. Kathmandu: Department of National Parks and Wildlife Conservation.
- Dodman, T. and Guinan, Y. (1989) Notes on birds recorded in Nepal, March–April 1989. Unpublished report.
- Eames, J. C. (1995) The Bengal Florican *Eupodotis bengalensis* in Indochina. *Forktail* 11: 39–46.
- Eames, J. C. (1997) A preliminary survey for the Bengal Florican in Cambodia. *Nat. Hist. Bull. Siam Soc.* 45: 99–106.
- Inskipp, C. and Collar, N. J. (1984) The Bengal Florican: its conservation in Nepal. *Oryx* 18: 30–35.
- Inskipp, C. and Inskipp, T. (1983) *Report on a Survey of Bengal Floricans (Houbaropsis bengalensis) in Nepal and India, 1982*. ICBP Study Report No. 2. Cambridge: International Council for Bird Preservation.
- Javed, S. and Rahmani, A. R. (1998) Conservation of the avifauna of Dudwa National Park, India. *Forktail* 14: 55–64.
- Jnawali, S. R. and Wegge, P. (1999) Importance of tall grassland in megaherbivore conservation. Pp. 84–91 in C. Richard, K. Basnet, J. P. Sah and Y. Raut, eds. *Grassland ecology and management in protected areas of Nepal. Proceedings of a workshop. Vol II: Terai protected areas*. Kathmandu: DNPWC, ICIMOD and WWF Nepal.
- Manakadan, R. and Rahmani, A. R. (1986) *Study of ecology of certain endangered species of wildlife and their habitats: the Great Indian Bustard. Annual report 3*. Bombay: Bombay Natural History Society.
- Narayan, G. (1992) Ecology, distribution and conservation of the Bengal Florican *Houbaropsis begalensis* (Gmelin) in India. PhD thesis, University of Bombay.
- Narayan, G. (1995) Conservation of Bengal Florican. Pp. 20–22 in L. Vijayan, ed. *Avian conservation in India*. Coimbatore: Salim Ali Centre for Ornithology.
- Narayan, G. and Rosalind, L. (1990) An introduction to the Bengal Florican. Pp. 9–16 in *Status and ecology of the Lesser and Bengal Floricans, with reports on Jerdon's Courser and Mountain Quail*. Bombay: Bombay Natural History Society.

- Peet, N. B. (1997) Biodiversity and management of tall grasslands in Nepal. PhD thesis. University of East Anglia, Norwich.
- Peet, N. B., Watkinson, A. R., Bell, D. J. and Sharma, U. R. (1999) The conservation management of *Imperata cylindrica* grassland in Nepal with fire and cutting: an experimental approach. *J. Appl. Ecol.* 36: 373–387.
- Rahmani, A. R. (1988) Grassland birds of the Indian subcontinent: a review. Pp. 187–204 in P. D. Goriup, ed. *Ecology and conservation of grassland birds*. Cambridge, U.K.: International Council for Bird Preservation.
- Rahmani, A. R. (1992) Threatened fauna of the Indian grasslands. Pp. 143–150 in K. P. Singh and J. S. Singh, eds. *Tropical ecosystems: ecology and management*. New Delhi: Wiley Eastern.
- Rahmani, A. R. (2001) *Status of the Bengal Florican Houbaropsis bengalensis in Uttar Pradesh, India*. Bombay: Bombay Natural History Society.
- Rahmani, A. R., Narayan, G., Rosalind, L., Sankaran, R. and Ganguli, U. (1991) Status of the Bengal Florican *Houbaropsis bengalensis* in India. *J. Bombay Nat. Hist. Soc.* 88: 349–375.
- Resources Nepal (1998) *GIS Database of Protected Areas of Nepal*. Kathmandu: Department of National Parks and Wildlife Conservation, United Nations Development Programme, and Resources Nepal.
- Ripley, S. D. (1982) *A synopsis of the birds of India and Pakistan; together with those of Nepal, Sikkim, Bhutan and Sri Lanka*. Second edition. Bombay: Bombay Natural History Society.
- Sankaran, R. (1996) Territorial displays of the Bengal Florican. *J. Bombay Nat. Hist. Soc.* 93: 167–177.
- Sankaran, R. and Rahmani, A. R. (1986) *Study of ecology of certain species of wildlife and their habitats: the Lesser Florican. Annual report 2, 1985–86*. Bombay: Bombay Natural History Society.
- Weaver, D. J. (1991) A survey of Bengal Floricans (*Houbaropsis bengalensis*) at Royal Suklaphanta Wildlife Reserve and Royal Bardia National Park, western Nepal, 1990. Unpublished report to Oriental Bird Club.

Nabin Baral, Department of Environmental Studies, Florida International University, Miami, Florida 33199, USA.  
Email: nbaral@yours.com

Nilesh Timilsina, Department of Environmental Studies, Florida International University, Miami, Florida 33199, USA.  
Email: ntimilsina@yahoo.com

Bijay Tamang, Bird Conservation Nepal, PO Box 12465, Kathmandu, Nepal. Email: kbtamang@mail.com.np